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02460B/02 D12 BROS-01.07.77 BROSTE INDUSTRIAS *GB 2000-430 30.06.78-GB-028487 (+027652) (10.01.79) A23b-04/04 Smoke flavoured fish prodn. - by electrostatic spraying of powder compsn. contg. salt and smoke condensate	D(2-A3, 3-A2, 3-H1C). 87
<p>Smoke-flavoured fish is prepd. by coating the fish with a powdered smoke flavour comps. contg. NaCl and a purified smoke condensate (I), and then curing the coated fish.</p> <p><u>ADVANTAGES</u></p> <p>Process affords smoke flavoured fish (esp. white fish such as haddock, cod and cod) in higher yield, more rapidly, and in fewer steps than conventional methods.</p> <p><u>DETAILS</u></p> <p>Smoke flavour comps. contains 0.2-10% pref. ca. 3 wt.% of (I). Before use the comps. is mixed with more NaCl and pref. also a carrier to aid in free-flow (e.g. maltodextrin) so that (I) content is pref. 0.05-0.5 wt.%. Smoke comps. is prepd. by the method of GB 1,321,905, and may also contain polyphosphates, sorbates, spices, and colouring agents, etc. and is pref. applied to fish using an electrostatic spray.</p> <p>After treatment the fish are dried for 0.5-1.0 hr. at 25°-40°C to remove 3-10 wt.% of fish as H₂O.</p>	<p><u>EXAMPLE</u></p> <p>Cleaned, filleted haddock were dyed, then sprayed with a comps. prepd. from NaCl (500 g) and smoke flavour (40 g) (GB 1,321,905) to give ca 40 g NaCl/kg of fish. The powder was applied using a 'Volstatic' (RTM) electrostatic spray gun. The fillets were then dried for 40 min. at 26°C and NaCl and (I) were shown to be uniformly distributed throughout the fish (yield ca 95% of untreated wt.)(4pp478).</p> <p>GB2000430</p>

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(54) Producing smoked fish.

(57) A method of producing smoke-flavoured fish is described in which a smoke flavour composition in powder form comprising salt and a smoke condensate is uniformly dispersed, preferably electrostatically, over the surface of cleaned fish, particularly white fish and the coated fish is then cured until the fish has the desired texture. This generally takes up to an hour at 25 – 40°C. The process and intensity of flavour are highly controllable and the resulting fish has been found to retain more of its weight after curing than has been the case with previous smoking methods.

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SPECIFICATION

Method for producing smoke flavoured fish.

5 This invention relates to a method of producing smoke-flavoured fish using a smoke-flavour composition.

The traditional preparation of smoked fish, fish splits or fillets of fish (hereinafter for convenience
10 singly referred to under the generic name "fish") generally involves, after cleaning and, if desired, filleting or splitting the fish, the steps of brining, draining, drying and smoking the fish until the intensity of taste and colour required by the producer has
15 been obtained. The cleaned fish is usually salted in a pickle brine of 70–80% saturation, often containing added colour or dye, for from 10 to 40 minutes dependent on the size and type of the fish. During
20 this brining, the fish generally absorbs from 5–10% of its weight of the pickle, and this leads to a salt content in the final product of from 0.5 to 3%. This is dependent on the desired quality and flavour of the end product.

After pickling, the fish is usually left to drain either
25 in trays or supported on wires. The draining period against varies from fish to fish but is typically from about three to twelve hours (e.g. overnight).

During this period, the fish loses weight, including a substantial part, if not all, of the 5–10% increase
30 obtained by pickling. The fish is then smoked, either for from 2–4 hours at from about 26–30°C in a kiln (cold smoking) or from 7–10 hours at from 95–100°C (hot smoking). During this smoking process, the fish again loses weight, perhaps 10–15%, thus producing
35 a fish sample weighing less than 90%, and frequently less than 85%, of its original untreated weight.

Smoking technology has been developed considerably in recent years with the advent of smoke
40 flavours. British Patent Specifications Nos. 1,101,806; 1,321,905 and 1,342,886 for example describe in detail the preparation of various types of composition having a smoke flavour. The preparation of solid, liquid and emulsified solutions is
45 described and these compositions have in practice been added either to the fish pickle or sprayed directly onto the fish in the form of an aqueous solution. However, because of the continual change in
50 strength of the pickle solution due to the osmotic effect of water from the fish, and hence the continual addition of flavour needed, it has not been possible to control these processes sufficiently for successful commercial use.

We have now found that a smoke flavour salt-based composition may readily be applied in powder
55 form simply to cleaned, unpickled fish. Subsequent drying of the coated fish has been found to give a smoke fish product by older established methods but the number of steps involved in the process are
60 fewer and that time taken to produce smoked fish may be considerably reduced. Furthermore, the yields of fish we obtain have been found to be higher than those obtainable using established methods.

According to one aspect of the invention, we provide a method of producing smoke-flavoured fish

wherein fish is coated with a smoke flavour composition in powder form comprising salt and a purified smoke condensate and subsequently cured. The curing generally takes place at an elevated temperature
70 and the duration of curing can be varied over wide limits until the desired smoke fish texture is obtained.

The amount of the smoke flavour composition employed and its concentration will depend on the
75 flavour and texture requirements of the producer of the smoked fish but a concentration of from about 0.05 to 0.5% by weight of smoke condensate in the powder with which the fish is coated generally leads to an acceptable flavour intensity.

80 The fish will, of course, desirably be cleaned, gutted and washed and, if desired, filleted or split prior to coating. Coating may be effected using a variety of methods e.g. automatic sprinkling or vibratory shaking through a sieve, the fish being positioned on
85 traps or wires or nets which may be either stationary or moving. However, we have found electrostatic spraying of the powder onto the fish using an electrostatic spray gun to be the most convenient method in view of the uniform dispersion which may
90 be obtained and the minimisation of loss or wastage of the smoke-flavoured powder.

The high proportion of salt in the smoke flavoured compositions assists the release of and dissolves in the soluble protein and water on the surface of the
95 fish. This reaction becomes progressive throughout the whole depth of the fish, very quickly producing a complete dispersion of smoke flavour and salt throughout the total mass of the fish.

This dispersion and release of water and protein is
100 accelerated and textural qualities are built, if after applying the smoke flavour composition, the fish is placed in a drying oven with a current of dry air passing over it. A temperature of from 25°–40°C has been found most suitable and a drying time of up to
105 about an hour (e.g. from ½–1 hour) has been found to produce the desired texture. For an acceptable texture, it is usually necessary to draw off from 3–10% by weight of the fish as moisture. The velocity of the air current and temperature may be varied
110 depending on the nature of the pellicle or outer layer formed on the fish as it dries since it is undesirable to allow too firm a pellicle to form.

By controlling curing, as described above, it is possible to obtain fish in which more water and
115 probably protein have been retained than in those obtained by conventional smoking and curing methods and the weight loss of the fish is reduced. Fish comprising from 90–100% of their wet untreated weight have been obtained. Both these factors are advantageous but it will further be appreciated that the process of the invention obviates the need for large brining tanks and saves a considerable amount of time not only in the smoking process, but in the total overall processing time. Thus, the advantages of smoked fish are many.

The concentration of the smoke condensates in the composition may be varied within wide limits, e.g. from 0.2 to 10% by weight but we have found that for convenience in storage, a concentration of approximately 3% is preferred. Depending on the strength

of the condensate, the composition will, prior to use, generally be mixed with further salt and, preferably, a further carrier serving to assist or maintain the particulate free-running nature of the composition e.g. maltodextrin. The proportion of mixing will, of course, be determined by the desired salt concentration and intensity of taste in the fish required by the consumer.

The composition may also contain amounts of various permitted colouring agents. These may be present in the composition as stored or may be added to the composition prior to coating fish. In addition, amounts of other permitted salts, e.g. polyphosphates which assist in water retention and sorbates which both assist water-retention and are anti-oxidants may be present. Spice ingredients may also be added if desired.

Whilst of benefit in the smoking of fish generally, the invention has been found of particular benefit in the smoking of white fish, for example haddock, cod and coley. Herrings can also be smoked by this method, slight variations being made in the length of drying and the salt and smoke concentrations so that up to about 15% of the weight of the wet untreated fish is deliberately lost.

The smoke flavour composition may be prepared by methods conventional in the art for such products. British Patent Specification No. 1,321,905 described for example a process which comprises destructively distilling the wood of deciduous trees and/or conifers or peat in the presence of 4- to 30-fold excess of air at a temperature of from 400-1200°C, the smoke being condensed in an artificially created thermal, gravitational or electrostatic field. The condensate is then fractionated to provide three fractions which may be used singly or in combination. Fractionation generally comprises isolating the first and second fractions in an alkaline medium, removing undesired ballast components in an acid medium to leave a residuum and extracting a third fraction from the residuum in an acid medium.

The invention will be more particularly described in the following Examples which should not be considered as limiting:

Example 1

A smoke salt or a smoke condensate mixed with salt as carrier, is mixed homogeneously with additional salt in the following proportions:

50	salt	500 g
	* smoke flavour	40 g

* (a 3% concentrate of smoke condensate on salt prepared by a method similar to that described in Example VI of British Patent Specification No. 1,321,905 and maltodextrose).

Fish (haddocks) are cleaned and filleted and immersed for 3 seconds in a colour bath containing approved colouring matter. They are then placed on a tray or conveyor after which the tray is conveyed to a spraying station where the above-mentioned mixture is sprayed on by means of electrostatics using a Volstatic electrostatic spray gun. The powder is fed by a Venturi pump from a vibrated powder reservoir or from a fluidised bed reservoir. The air pressure is

approximately 1 bar.

The powder is transported to a spray head with adjustable fan nozzle by means of controlling the air flow to the head. The powder emission rate is typically 100 g per minute.

The distance from the head of the spray gun to the fillets of fish is approximately 15 cm and the voltage 60 kv with constant current at about 60 micro amps.

The above-mentioned salt mixture is applied in an even layer to the surface of the fillet of fish in an amount corresponding to 40 g of salt per kilo of fish. Thereafter the fillets are dried with dry air in a high-velocity oven at 26°C for 40 minutes.

Salt and flavour is now uniformly distributed in the fish, and the yield is approximately 95 percent of the untreated weight.

Example 2

A powder mixture or a liquid smoke flavour, prepared by a method similar to that described in Example VI of British Patent Specification No. 1,321,905 is mixed with salt and dry colouring matter in the following proportion:

90	salt	500 g
	* smoke flavour	40 g
	Permitted colours	0.6 g

95

*(as 3% concentrate of smoke condensate on salt and maltodextrose).

The fish is cleaned, filleted and placed on a tray which is advanced to the spraying station where the above-mentioned mixture is applied to the fillets by a method described in Example 1.

The coated fish is dried at 30°C for 45 minutes in a high-velocity oven. After the drying process both colour, salt and flavour are uniformly distributed in the fillet which has, at the same time, obtained a firm texture. The yield is approximately 91 percent.

Example 3

A powder mixture or a liquid smoke flavour similar to that of Example 2 is mixed with salt and other approved powdered food additives e.g. in the following proportion:

115	salt	500 g
	* smoke flavour	30 g
	permitted colour	0.4 g
	polyphosphate	15.0 g
	Potassium sorbate	20.0 g
	spices	15.0 g

125

*(as 3% concentrate of smoke condensate on salt and maltodextrose).

130

The fish is cleaned, placed on a net, and the mixture is applied by electrostatic spraying in an amount of from 25 to 40 g salt per kilo of fish, dependent on the type of product.

- 5 The drying process is carried out with dry air at a temperature of from 20 to 60°C as described in Example 1.

The yield depends on the texture desired for the end product, but is from 90 to 95 percent.

10

CLAIMS

1. A method of producing smoke-flavoured fish wherein the fish is coated with a smoke flavour composition in powder form comprising salt and a purified smoke condensate, and subsequently cured.
2. A method as claimed in claim 1 wherein the composition with which the fish is coated contains from 0.05 to 0.5% by weight of smoke condensate.
- 20 3. A method as claimed in claim 1 or claim 2 wherein the fish is coated with the composition by electrostatic spraying.
4. A method as claimed in any of claims 1-3 wherein curing is effected at from 25° to 40°C for up to one hour in a current of air.
- 25 5. A method as claimed in any of claims 1-4 wherein a smoke flavour composition in powder form containing from about 3% by weight of purified condensate is mixed with further salt and a carrier to maintain the particulate nature of the composition prior to and during coating of the fish.
- 30 6. A method as claimed in claim 5 wherein the carrier is maltodextrin.
7. A method as claimed in claim 1 substantially as hereinbefore described.
8. A method of producing smokeflavoured fish substantially as hereinbefore described with reference to the Examples.
9. Smoke-flavoured fish whenever produced by a method as claimed in any of claims 1-8.

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